must in large part be conceded. Whilst the earlier development of these faculties may be explained as due to natural selection, since some amount of each may well have been an advantage to the primitive man in his struggle for existence, it is yet true that their sudden and rapid development to a very much higher level in civilized communities cannot be traced to the struggle between man and man. It does not, however, follow that, because natural selection will not account for these extraordinary developments of the human brain, therefore we must have recourse to the assumption of supernatural agencies. Mr. Wallace seems so much convinced of the importance and capability of the principle of natural selection, that when it breaks down as an explanation he loses faith in all natural cause, and has recourse to metaphysical assumption. On the other hand, it must be contended that we know very little of the development, either in the individual or in various races, of these and other faculties of the mind. The formation of civilized communities has had the result of withdrawing the individual man almost entirely from the operation of natural selection. Such selection as still obtains operates by the struggle of communities rather than by that of individuals. Accordingly there is a possibility of the most useless "sports" making their appearance, and even establishing themselves in human communities as hereditary qualities. Mr. Gulick's notion that an initial tendency due to accidental variation can increase and develop in succeeding generations, without reference to the advantage or disadvantage of the species, would assuredly be applicable, if anywhere, to the human mind in communities where individuals are no longer subject to natural selection, or only to a minimal extent, and in relation to a few points of structure. Does the luxuriant development of some Professor's mathematical faculty, as compared with the poor numerical conceptions of an Australian black, offer really any greater difficulty of transition than do the 9-feet-long tail feathers of some Japanese barn-door fowls, as compared with the shorter feathers of other varieties? That is a question which can only be answered by a more elaborate analysis of the nature of the qualities compared than has, so far as I know, been hitherto accomplished.

E. RAY LANKESTER.

GALTON'S AFRICAN TRAVELS.

Narrative of an Explorer in Tropical South Africa; being an Account of a Visit to Damara Land in 1851. By F. Galton. With *Vacation Tours in* 1860 *and* 1861, by Sir George Grove, F. Galton, and W. G. Clark. (London: Ward, Lock, and Co., 1889)

THE editor of the Minerva Library has added Mr. Francis Galton's "Narrative of an Explorer in Tropical South Africa" to a library consisting only of "works of the most widely-spread and lasting popularity, which have proved themselves worthy of a permanent place in literature." Had the stamp of popularity not been so precisely insisted upon as a title to admission into this particular series, it might have been his gracious task, now and then, to have rescued from oblivion a stray work which had failed to obtain recognition from causes in no way affecting its intrinsic merits. Books of travel, for instance, have often suffered from inopportune publication, and, being out of season, have fallen flat and unheeded; whereas, if introduced a quarter of a century later, they would have been welcomed by an expectant public, educated for the occasion. But the condition, as it now stands, relieves the editor from a difficult and somewhat delicate responsibility, the adequate discharge of which might well need the exercise of more than one man's judgment and experience. Fortunately for the book under notice, it fulfils all the professed requirements of Mr. Bettany's prospectus. It presents quite a model in respect of style, and is essentially the production of a master mind. The writer lucidly recounts his experiences for the instruction as well as entertainment of his readers, and the outcome of his labour is a success to himself and a benefit to his fellows. His narrative is interesting and well sustained; his descriptive powers are manifestly considerable; his appreciation of men and things, the animate and inanimate, is admirable; and he is realistic to the legitimate extent of insuring credence for a record of personal adventure not untinged with romance.

Independently of these considerations, however, there is another reason why the reproduction of Mr. Galton's book at the present hour is practically useful. He treats of a particular section of Africa which has hardly received its fair amount of attention from the politicians and geographers of Europe, when discussing the great partition question of the day. The Congo has had the lion's share of solicitude as regards the western coast-line; while the spirited and intelligent action of the British East African Company, and movements of rival or contemporary Companies, have resulted in throwing, as it were, a broad bright light upon the whole length of eastern sea-board from Guardafui to the Zambesi. Names such as Mombasa and Vitu are becoming familiar as Zanzibar and Mozambique, and the practical effect of Messrs. Johnston and Thomson's successful journeys has been to introduce into our school teaching the true stories of Kilimanjaro and the Masai Land. Below the Congo there has been little demand for information, and consequently little supply. The knowledge that Portugal is owner of the coast-line from the much-coveted mouth of that river to that of the Kunene, has appeared sufficient to render Benguela and Mossamedes, with their inland territories and contiguous tracts, matters of secondary interest; and below Mossamedes nothing but a political embroglio has caused Walfisch Bay and Angra Pequena to emerge from out the haziness of quasi-mythical places. Mr. Galton's narrative will not only be found instructive in itself, but it cannot fail to lead the uninitiated reader into references and inquiries also full of enlightenment; and even those who are well up in African geography, and may have read the book on its first appearance, will most probably derive advantage in reverting to its pages. The part of the Dark Continent comprehended in its treatment is from somewhere near the mouth of the Kunene to the mouth of the Orange River, and may be roughly indicated by a figure to which the parallels 17° and 27° S. latitude give a northern and southern boundary, and the meridians 12° and 20° longitude western and eastern limits. In the appendix much of the exploration of later years is reviewed, and the names of Messrs. Anderson and Coates Palgrave, Lord Mayo, and Père Duparquet of the Huilla Mission are honourably mentioned. Those of Drs. Höpfner and Stapff might have been added, bringing up to May 1886 the roll of authorities whose labours need only some new political complication to become of palpable value. Moreover, it may here be parenthetically stated that the West African Telegraph Company have recently prolonged their cable south of St. Paul de Loanda, opened as a station in 1886—a proceeding which should facilitate the acquisition of much new geographical information in connection with the region specified. Already has a contribution from one of its officers appeared in the Proceedings of the Royal Geographical Society, from which we learn that the harbour of Mossamedes is only second to that of Loanda among the harbours of Western Africa, and that the latter, possessing less depth of water, and being smaller, suffers in the comparison. Benguela is described as the more important commercial port, the total amount of its annual imports and exports (£268,398) being nearly four times more than those of Mossamedes.

Now that thirty-nine years have passed since this exploration was undertaken it may be well to recall its extent and character. As apparent from the map illustrative of his labours, Mr. Galton moved in a north-easterly direction from Walfisch Bay to Barmen, journeying a distance of nearly 200 miles. After an excursion from that place—called "the head seat of intelligence as regards Damara and Hottentot movements"—he struck off to Ovampo Land in the north by a route involving a slight detour to the east. But before making a fair start from Schmelen's Hope (a point somewhat further inland than Barmen), he was led by circumstances to Eikhams and Rehoboth in the south; and part of the return road from Ondongo, the *ultima Thule* of his northerly journey, was by a track other than that he had at first pursued. From the date that his waggons left Schmelen's Hope to that of their return, a period of exactly five months elapsed. Of these, we are told that "ninety days were employed in journeying onwards, independently of such excursions as were made from time to time to look out for roads." The return distance is reckoned at about 462 miles, the average rate of travelling being nine and a half miles a day—fair indeed with a more or less improvised carriage, barbarous retinue, and tired or hungry and thirsty bullocks.

Some notion of the privations endured may be gathered from our traveller's statement that, on his leaving Schmelen's Hope for Ovampoland, his "biscuit and every kind of vegetable food had been eaten up"; or, as later expressed, he had "no biscuit, no flour, or anything of the sort." He and his party had to live on the oxen and sheep they possessed, and the game they contrived to shoot on the way, so that grain-food was a special luxury. Milk, though used in profusion by the Damaras, could rarely be purchased from them, owing to some impeditive superstition. Their ordinary *pabulum*, pig-nuts, was "worthless and indigestible," inasmuch as it should be "eaten in excessive quantities to afford enough nourishment to sustain life." As to water, this was a more serious matter still. On some days it utterly failed; on others it was brackish, or barely drinkable—as may be inferred from the following description of a *vley*, or watering-place:—

> "Fancy a shallow pool, from 10 to 20 yards across, and from 6 to 12 inches deep, in which a herd of wild animals, say fifty zebras, have been splashing and rolling themselves all night, and which they have left in every respect like the water pumped out of a farmyard; and, where wild animals are wanting, the oxen, in spite of every precaution, will do the same."

The sporting adventures of the book are especially remarkable. It is not improbable that more than one tender-minded reader will accord sympathy to a wounded giraffe hunted to the death, or a dog slain for the sake of its skin—both occasions illustrating an act perpetrated to satisfy the pressing wants of man. Few, however, can fail to appreciate the manly qualities of a traveller whose career in Africa brings him into frequent and willing contact with the lion, rhinoceros, hippopotamus, elephant, and those larger and more formidable animals contention with which is risk of limb and life. The same stout-heartedness is exhibited in his intercourse with the savage inhabitants of the tracts through which he moves, and in the fearless but efficient diplomacy which characterizes his dealings with Bushman and Hottentot, Namaqua, Damara, Ovampo, or whatever the designation of those with whom he has to do.

Not the least exciting part of Mr. Galton's narrative will be found in the penultimate chapter. At this time he had retraced his steps from Ovampo Land to Barmen. Instead, however, of continuing his return journey to the coast, he resolved to devote three and a half out of the four months which would necessarily intervene before the arrival of an expected schooner in Walfisch Bay, to an expedition to the eastward, for the double purpose of seeing something of the Hottentot inhabitants, and ascertaining how far correct was the statement that the Karrikarri Desert was "interposed as an impracticable barrier between the sea-coast countries and Lake 'Ngami." The following extract from this particular chapter (pp. 168–69) furnishes a good specimen of the writer's descriptive powers. He and his associates had just repaired some circular walls of loose stones intended to serve as shooting-screens:—

> "It is one of the most strangely exciting positions that a sportsman can find himself in, to lie behind one of these screens or holes by the side of a path leading to a watering-place so thronged with game as 'Tounobis. Herds of gnus glide along the neighbouring paths in almost endless files; here standing out in bold relief against the sky, there a moving line just visible in the deep shades; and all as noiseless as a dream. Now and then a slight pattering over the stones makes you start; it jars painfully on the strained ear, and a troop of zebras pass frolicking by. All at once you observe, 20 or 30 yards off, two huge ears pricked up high above the brushwood; another few seconds, and a sharp solid horn indicates the cautious and noiseless approach of the great rhinoceros. Then the rifle or gun is poked slowly over the wall, which has before been covered with a plaid, or something soft, to muffle all grating sounds; and you keep a sharp and anxious look-out through some cranny in your screen. The beast moves nearer and nearer; you crouch close up under the wall, lest he should see over it and perceive you. Nearer, nearer still; yet somehow his shape is indistinct, and perhaps his position unfavourable to warrant a shot. Another moment, and

he is within 10 yards, and walking steadily on. There lies a stone, on which you had laid your caross and other things, when making ready to enter your shooting-screen; the beast has come to it, he sniffs the taint of them, tosses his head up wind, and turns his huge bulk full broadside on to you. Not a second is to be lost. Bang! and the bullet lies well home under his shoulder. Then follows a plunge and a rush, and the animal charges madly about, making wide sweeps to right and left with his huge horn, as you crouch down still and almost breathless, and with every nerve on the stretch.

"He is off; you hear his deep blowing in the calm night; now his gallop ceases. The occasional rattling of a stone alone indicates that he is yet a-foot; for a moment all is still, and then a scarcely audible 'sough' informs you that the great beast has sunk to the ground, and that his pains of death are over."

The author has long since been so well known as a gold medallist and leading member of the Royal Geographical Society, and for his important contributions to anthropology and other departments of science, that it would be superfluous at this time to dwell on the value of his explorations, compared with those of the ordinary and less-gifted traveller. His exceptional aptitude for what may be called professional travel is well exemplified at pp. 180–82 of the volume now republished, in which, among other useful hints, he gives plain and practical instructions for selecting the best sort of travelling compass and checking distances and directions. His manual on the "Art of Travel" has for many years been a standard work of reference; while no one who reads, in the "Narrative of an Explorer," his amusing record of "a series of observations" taken by sextant upon the figure of a Hottentot lady—with results worked out "by trigonometry and logarithms"—can affirm that his sense of humour has been blunted by scientific pursuits.

A republication of "Vacation Tours in 1860 and 1861"—papers by Sir George Grove and the late Mr. W. G. Clark, added to one by Mr. Galton—enhances the value of this new accession to the Minerva Library.

OUR BOOK SHELF.

Practical Photometry: a Guide to the Study of the Measurement of Light. By W. J. Dibdin. (London: Walter King, 1889.)

THIS work forms a good practical text-book on the art of photometry, which, both scientifically and commercially, is becoming more and more important. It contains a comprehensive account of the various methods in daily use, so that the student, when he finds that he is dealing with instruments and methods unfamiliar to him, may turn to this book as a guide to the many precautions necessary to insure accurate results. The first few chapters deal with the history and principles of photometry, together with horizontal, radial, and jet photometers, and diagrams are given of the determinations of the quantity of light afforded in all directions horizontally by three classes of flames tested at every 10°, and also of Dr. Pole's method of expressing the illuminating power and rates of consumption per hour of fifteen-candle gas. In chapters vi. and vii. we have a discussion on the various standards of light which have been and are still in use, followed by the numerous proposed substitutes, such as Harcourt's pentane, Sugg's sixteen-candle argand, Methuen's screen, &c. The apparatus necessary to check and measure the flow of gas to the standard burner is given in chapter viii., with detailed descriptions. Chapters ix. and x. treat of "The Examination and Adjustment of a Gas-testing Photometer" and "Colour Photometry," the latter dealing with methods of estimating the colour and intensity of the illumination of fabrics, &c. Lastly, in chapter xi., on "Stellar Photometry," the author gives an account of the methods employed by Sir John Herschel, Zöllner, and others, concluding with a description of a method proposed by himself.

The appendix contains some useful pieces of miscellaneous information, and tables of illuminating power of sperm candles, candle corrections, &c. The work is well illustrated with numerous woodcuts of the various instruments employed.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Testing of Colour-Blindness.

THE important article in NATURE of September 5 (p. 438) will have been read by all friends of education with deep and melancholy interest.

I desire to point out that the real remedy ought not to be dealt with by an Act of Parliament, partly because this is a makeshift, and partly because the sudden dismissal of a trained seaman for a constitutional defect is so cruel that human nature would get very much in the way of such an Act of Parliament.

What is wanted is that the colour sight and other measurable faculties of youths should be tested before they go out into life. It is a detail of practical anthropometry. Just as no parent would think of encouraging his son to become a barrister when he knew that he stammered or was deaf, so no parent would waste money in training his son to be an engine-driver or a sailor when he knew—as he ought to know—that the lad was colour-blind.

I protest against a defect of our educational system being treated as a defect of legislation or of administration, and I trust that the friends who seek that scientific education should have its due place will move in this direction, and thus prevent the cruelty to seamen and their families as well as the deaths of their fellow-creatures which are at present possible from the causes indicated in your article.

I desire to ask if some of your readers will kindly furnish information, through your columns, as to where the colour-tests can be obtained, their cost, and the literature respecting them.

9 King Street, Oxford, September 19. J. F. HEYES.

Mites.

IN the grounds of the Leicester Museum there are some half-dozen young lime trees, about fifteen years old, of which the trunks and under sides of the main branches are covered with an extremely thin glistening film. It seems to consist of a similar material to that of which spider's web is made, but spread out into a film instead of being spun into thread. When rubbed up it has all the appearance of spider's web similarly treated. But there are no spiders visible, except here and there an Epeira, who has fixed his geometric web to some protuberances on the trunk.

The bark, however, is thickly dotted over with small yellowish mites, very similar to cheese mites in size, form, and colour. Some of these mites are creeping on the outside of the film also, and a few of them are captured in the webs of the Epeira. No other trees appear to be affected except the limes, and only one particular row of these. I have found a few of the mites, but no film, on other limes in the grounds, but none on horse-chestnuts or laburnums which stand nearer to the affected trees.

How has this film been produced? and are the mites connected with it as cause or effect? F. T. MOTT.

Leicester, September 23.